

SEQUENCE LISTING

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<120> METHODS AND COMPOSITIONS CONCERNING ALTERED YELLOW
FEVER VIRUS STRAINS

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<140> UNKNOWN
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<210> 1
<211> 10862
<212> DNA
<213> Yellow fever virus

<220>
<221> CDS
<222> (119)..(10351)

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Met Ser Gly Arg Lys Ala Gln Gly Lys Thr Leu Gly Val Asn Met Val
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Arg Arg Gly Val Arg Ser Leu Ser Asn Lys Ile Lys Gln Lys Thr Lys
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Gln Ile Gly Asn Arg Pro Gly Pro Ser Arg Gly Val Gln Gly Phe Ile
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Leu Lys Arg Leu Trp Lys Met Leu Asp Pro Arg Gln Gly Leu Ala Val
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Leu Arg Lys Val Lys Arg Val Val Ala Ser Leu Met Arg Gly Leu Ser

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90

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 Trp Cys Pro Asp Ser Met Glu Tyr Asn Cys Pro Asn Leu Ser Pro Arg
 165 170 175

gag gag cca gat gac att gat tgc tgg tgc tat ggg gtg gaa aac gtt 694
 Glu Glu Pro Asp Asp Ile Asp Cys Trp Cys Tyr Gly Val Glu Asn Val
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 Arg Gln Glu Lys Trp Met Thr Gly Arg Met Gly Glu Arg Gln Leu Gln
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 Lys Ile Glu Arg Trp Phe Val Arg Asn Pro Phe Ala Val Thr Ala
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 Leu Thr Ile Ala Tyr Leu Val Gly Ser Asn Met Thr Gln Arg Val Val
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 Ile Ala Leu Leu Val Leu Ala Val Gly Pro Ala Tyr Ser Ala His Cys
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 Ile Gly Ile Thr Asp Arg Asp Phe Ile Glu Gly Val His Gly Thr
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 Trp Val Ser Ala Thr Leu Glu Gln Asp Lys Cys Val Thr Val Met Ala

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cct gac aag cct tca ttg gac atc tca cta gag aca gta gcc att gat				1126
Pro Asp Lys Pro Ser Leu Asp Ile Ser Leu Glu Thr Val Ala Ile Asp				
325	330	335		
aga cct gct gag gtg agg aaa gtg tgc aat gca gtt ctc act cat				1174
Arg Pro Ala Glu Val Arg Lys Val Cys Tyr Asn Ala Val Leu Thr His				
340	345	350		
gtg aag att aat gac aag tgc ccc agc act gga gag gcc cac cta gct				1222
Val Lys Ile Asn Asp Lys Cys Pro Ser Thr Gly Glu Ala His Leu Ala				
355	360	365		
gaa gag aac gaa ggg gac aat gcg tgc aag cgc act tat tct gat aga				1270
Glu Glu Asn Glu Gly Asp Asn Ala Cys Lys Arg Thr Tyr Ser Asp Arg				
370	375	380		
ggc tgg ggc aat ggc tgc att ggc cta ttt ggg aaa ggg agc att gtg gca				1318
Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Ser Ile Val Ala				
385	390	395	400	
tgc gcc aaa ttc act tgc aat tcc atg agt ttg ttt gag gtt gat				1366
Cys Ala Lys Phe Thr Cys Ala Lys Ser Met Ser Leu Phe Glu Val Asp				
405	410	415		
cag acc aaa att cag tat gtc atc aga gca caa ttg cat gta ggg gcc				1414
Gln Thr Lys Ile Gln Tyr Val Ile Arg Ala Gln Leu His Val Gly Ala				
420	425	430		
aag cag gaa aat tgg act acc gac att aag act ctc aag ttt gat gcc				1462
Lys Gln Glu Asn Trp Thr Asp Ile Lys Thr Leu Lys Phe Asp Ala				
435	440	445		
ctg tca ggc tcc cag gaa gtc gag ttc att ggg tat gga aaa gct aca				1510
Leu Ser Gly Ser Gln Glu Val Phe Ile Gly Tyr Gly Lys Ala Thr				
450	455	460		
ctg gaa tgc cag gtg caa act gcg gtg gac ttt ggt aac agt tac atc				1558
Leu Glu Cys Gln Val Gln Thr Ala Val Asp Phe Gly Asn Ser Tyr Ile				
465	470	475	480	
gct gag atg gaa aca gag agc tgg ata gtg gac aga cag tgg gcc cag				1606
Ala Glu Met Glu Thr Glu Ser Trp Ile Val Asp Arg Gln Trp Ala Gln				
485	490	495		
gac ttg acc ctg cca tgg cag agt gga agt ggc ggg gtg tgg aga gag				1654
Asp Leu Thr Leu Pro Trp Gln Ser Gly Ser Gly Val Trp Arg Glu				
500	505	510		
atg cat cat ctt gtc gaa ttt gaa cct ccg cat gcc gcc act atc aga				1702
Met His His Leu Val Glu Phe Glu Pro Pro His Ala Ala Thr Ile Arg				
515	520	525		
gta ctg gcc ctg gga aac cag gaa ggc tcc ttg aaa aca gct ctt act				1750
Val Leu Ala Leu Gly Asn Gln Glu Gly Ser Leu Lys Thr Ala Leu Thr				

530	535	540	
ggc gca atg agg gtt aca aag gac aca aat gac aac aac ctt tac aaa			1798
Gly Ala Met Arg Val Thr Lys Asp Thr Asn Asp Asn Asn Leu Tyr Lys			
545	550	555	560
cta cat ggt gga cat gtt tct tgc aga gtg aaa ttg tca gct ttg aca			1846
Leu His Gly Gly His Val Ser Cys Arg Val Lys Leu Ser Ala Leu Thr			
565	570	575	
ctc aag ggg aca tcc tac aaa ata tgc act gac aaa atg ttt ttt gtc			1894
Leu Lys Gly Thr Ser Tyr Lys Ile Cys Thr Asp Lys Met Phe Phe Val			
580	585	590	
aag aac cca act gac act ggc cat ggc act gtt gtg atg cag gtg aaa			1942
Lys Asn Pro Thr Asp Thr Gly His Gly Thr Val Val Met Gln Val Lys			
595	600	605	
gtg tca aaa gga gcc ccc tgc agg att cca gtg ata gta gct gat gat			1990
Val Ser Lys Gly Ala Pro Cys Arg Ile Pro Val Ile Val Ala Asp Asp			
610	615	620	
ctt aca gcg gca atc aat aaa ggc att ttg gtt aca gtt aac ccc atc			2038
Leu Thr Ala Ala Ile Asn Lys Gly Ile Leu Val Thr Val Asn Pro Ile			
625	630	635	640
gcc tca acc aat gat gat gaa gtg ctg att gag gtg aac cca cct ttt			2086
Ala Ser Thr Asn Asp Asp Glu Val Leu Ile Glu Val Asn Pro Pro Phe			
645	650	655	
gga gac agc tac att atc gtt ggg aga gga gat tca cgt ctc act tac			2134
Gly Asp Ser Tyr Ile Ile Val Gly Arg Gly Asp Ser Arg Leu Thr Tyr			
660	665	670	
cag tgg cac aaa gag gga agc tca ata gga aag ttg ttc act cag acc			2182
Gln Trp His Lys Glu Gly Ser Ser Ile Gly Lys Leu Phe Thr Gln Thr			
675	680	685	
atg aaa ggc gtg gaa cgc ctg gcc gtc atg gga gac acc gcc tgg gat			2230
Met Lys Gly Val Glu Arg Leu Ala Val Met Gly Asp Thr Ala Trp Asp			
690	695	700	
ttc agc tcc gct gga ggg ttc ttc act tcg gtt ggg aaa gga att cat			2278
Phe Ser Ser Ala Gly Gly Phe Phe Thr Ser Val Gly Lys Gly Ile His			
705	710	715	720
acg gtg ttt ggc tct gcc ttt cag ggg cta ttt ggc ggc ttg aac tgg			2326
Thr Val Phe Gly Ser Ala Phe Gln Gly Leu Phe Gly Gly Leu Asn Trp			
725	730	735	
ata aca aag gtc atc atg ggg gcg gta ctt ata tgg gtt ggc atc aac			2374
Ile Thr Lys Val Ile Met Gly Ala Val Leu Ile Trp Val Gly Ile Asn			
740	745	750	
aca aga aac atg aca atg tcc atg agc atg atc ttg gta gga gtg atc			2422
Thr Arg Asn Met Thr Met Ser Met Ile Leu Val Gly Val Ile			

755	760	765	
atg atg ttt ttg tct cta gga gtt ggg gcg gat caa gga tgc gcc atc Met Met Phe Leu Ser Leu Gly Val Gly Ala Asp Gln Gly Cys Ala Ile 770 775 780			2470
aac ttt ggc aag aga gag ctc aag tgc gga gat ggt atc ttc ata ttt Asn Phe Gly Lys Arg Glu Leu Lys Cys Gly Asp Gly Ile Phe Ile Phe 785 790 795 800			2518
aga gac tct gat gac tgg ctg aac aag tac tca tac tat cca gaa gat Arg Asp Ser Asp Asp Trp Leu Asn Lys Tyr Ser Tyr Tyr Pro Glu Asp 805 810 815			2566
cct gtg aag ctt gca tca ata gtg aaa gcc tct ttt gaa gaa ggg aag Pro Val Lys Leu Ala Ser Ile Val Lys Ala Ser Phe Glu Glu Gly Lys 820 825 830			2614
tgt ggc cta aat tca gtt gac tcc ctt gag cat gag atg tgg aga agc Cys Gly Leu Asn Ser Val Asp Ser Leu Glu His Glu Met Trp Arg Ser 835 840 845			2662
agg gca gat gag atc aat gcc att ttt gag gaa aac gag gtg gac att Arg Ala Asp Glu Ile Asn Ala Ile Phe Glu Glu Asn Glu Val Asp Ile 850 855 860			2710
tct gtt gtc gtg cag gat cca aag aat gtt tac cag aga gga act cat Ser Val Val Val Gln Asp Pro Lys Asn Val Tyr Gln Arg Gly Thr His 865 870 875 880			2758
cca ttt tcc aga att cgg gat ggt ctg cag tat ggt tgg aag act tgg Pro Phe Ser Arg Ile Arg Asp Gly Leu Gln Tyr Gly Trp Lys Thr Trp 885 890 895			2806
ggt aag aac ctt gtg ttc tcc cca ggg agg aag aat gga agc ttc atc Gly Lys Asn Leu Val Phe Ser Pro Gly Arg Lys Asn Gly Ser Phe Ile 900 905 910			2854
ata gat gga aag tcc agg aaa gaa tgc ccg ttt tca aac cgg gtc tgg Ile Asp Gly Lys Ser Arg Lys Glu Cys Pro Phe Ser Asn Arg Val Trp 915 920 925			2902
aat tct ttc cag ata gag gag ttt ggg acg gga gtg ttc acc aca cgc Asn Ser Phe Gln Ile Glu Phe Gly Thr Gly Val Phe Thr Thr Arg 930 935 940			2950
gtg tac atg gac gca gtc ttt gaa tac acc ata gac tgc gat gga tct Val Tyr Met Asp Ala Val Phe Glu Tyr Thr Ile Asp Cys Asp Gly Ser 945 950 955 960			2998
atc ttg ggt gca gcg gtg aac gga aaa aag agt gcc cat ggc tct cca Ile Leu Gly Ala Ala Val Asn Gly Lys Lys Ser Ala His Gly Ser Pro 965 970 975			3046
aca ttt tgg atg gga agt cat gaa gta aat ggg aca tgg atg atc cac Thr Phe Trp Met Gly Ser His Glu Val Asn Gly Thr Trp Met Ile His			3094

980	985	990	
acc ttg gag gca tta gat tac aag gag tgt gag tgg cca ctg aca cat			3142
Thr Leu Glu Ala Leu Asp Tyr Lys Glu Cys Glu Trp Pro Leu Thr His			
995	1000	1005	
acg att gga aca tca gtt gaa gag agt gaa atg ttc atg ccg aga tca			3190
Thr Ile Gly Thr Ser Val Glu Glu Ser Glu Met Phe Met Pro Arg Ser			
1010	1015	1020	
atc gga ggc cca gtt agc tct cac aat cat atc cct gga tac aag gtt			3238
Ile Gly Gly Pro Val Ser Ser His Asn His Ile Pro Gly Tyr Lys Val			
1025	1030	1035	1040
cag acg aac gga cct tgg atg cag gta cca cta gaa gtg aag aga gaa			3286
Gln Thr Asn Gly Pro Trp Met Gln Val Pro Leu Glu Val Lys Arg Glu			
1045	1050	1055	
gct tgc cca ggg act agc gtg atc att gat ggc aac tgt gat gga cgg			3334
Ala Cys Pro Gly Thr Ser Val Ile Ile Asp Gly Asn Cys Asp Gly Arg			
1060	1065	1070	
gga aaa tca acc aga tcc acc acg gat agc ggg aaa gtt att cct gaa			3382
Gly Lys Ser Thr Arg Ser Thr Asp Ser Gly Lys Val Ile Pro Glu			
1075	1080	1085	
tgg tgt tgc cgc tcc tgc aca atg ccg cct gtg agc ttc cat ggt agt			3430
Trp Cys Cys Arg Ser Cys Thr Met Pro Pro Val Ser Phe His Gly Ser			
1090	1095	1100	
gat ggg tgt tgg tat ccc atg gaa att agg cca agg aaa acg cat gaa			3478
Asp Gly Cys Trp Tyr Pro Met Glu Ile Arg Pro Arg Lys Thr His Glu			
1105	1110	1115	1120
agc cat ctg gtg cgc tcc tgg gtt aca gct gga gaa ata cat gct gtc			3526
Ser His Leu Val Arg Ser Trp Val Thr Ala Gly Glu Ile His Ala Val			
1125	1130	1135	
cct ttt ggt ttg gtg agc atg atg ata gca atg gaa gtg gtc cta agg			3574
Pro Phe Gly Leu Val Ser Met Met Ile Ala Met Glu Val Val Leu Arg			
1140	1145	1150	
aaa aga cag gga cca aag caa atg ttg gtt gga gga gta gtg ctc ttg			3622
Lys Arg Gln Gly Pro Lys Gln Met Leu Val Gly Val Val Leu Leu			
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gga gca atg ctg gtc ggg caa gta act ctc ctt gat ttg ctg aaa ctc			3670
Gly Ala Met Leu Val Gly Gln Val Thr Leu Leu Asp Leu Leu Lys Leu			
1170	1175	1180	
aca gtg gct gtg gga ttg cat ttc cat gag atg aac aat gga gga gac			3718
Thr Val Ala Val Gly Leu His Phe His Glu Met Asn Asn Gly Gly Asp			
1185	1190	1195	1200
gcc atg tat atg gcg ttg att gct gcc ttt tca atc aga cca ggg ctg			3766
Ala Met Tyr Met Ala Leu Ile Ala Ala Phe Ser Ile Arg Pro Gly Leu			

1205	1210	1215	
ctc atc ggc ttt ggg ctc agg acc cta tgg agc cct cg ^g gaa cg ^c ctt			3814
Leu Ile Gly Phe Gly Leu Arg Thr Leu Trp Ser Pro Arg Glu Arg Leu			
1220	1225	1230	
gtg ctg acc cta gga gca gcc atg gtg gag att gcc ttg ggt ggc gt ^g			3862
Val Leu Thr Leu Gly Ala Ala Met Val Glu Ile Ala Leu Gly Gly Val			
1235	1240	1245	
atg ggc ggc ctg tgg aag tat cta aat gca gtt tct ctc tgc atc ctg			3910
Met Gly Gly Leu Trp Lys Tyr Leu Asn Ala Val Ser Leu Cys Ile Leu			
1250	1255	1260	
aca ata aat gct gtt gct tct agg aaa gca tca aat acc atc ttg ccc			3958
Thr Ile Asn Ala Val Ala Ser Arg Lys Ala Ser Asn Thr Ile Leu Pro			
1265	1270	1275	1280
ctc atg gct ctg ttg aca cct gtc act atg gct gag gtg aga ctt gcc			4006
Leu Met Ala Leu Leu Thr Pro Val Thr Met Ala Glu Val Arg Leu Ala			
1285	1290	1295	
gca atg ttc ttt tgt gcc gtg gtt atc ata ggg gtc ctt cac cag aat			4054
Ala Met Phe Phe Cys Ala Val Val Ile Ile Gly Val Leu His Gln Asn			
1300	1305	1310	
ttc aag gac acc tcc atg cag aag act ata cct ctg gtg gcc ctc aca			4102
Phe Lys Asp Thr Ser Met Gln Lys Thr Ile Pro Leu Val Ala Leu Thr			
1315	1320	1325	
ctc aca tct tac ctg ggc ttg aca caa cct ttt ttg ggc ctg tgt gca			4150
Leu Thr Ser Tyr Leu Gly Leu Thr Gln Pro Phe Leu Gly Leu Cys Ala			
1330	1335	1340	
ttt ctg gca acc cgc ata ttt ggg cga agg agt atc cca gtg aat gag			4198
Phe Leu Ala Thr Arg Ile Phe Gly Arg Ser Ile Pro Val Asn Glu			
1345	1350	1355	1360
gca ctc gca gca gct ggt cta gtg gga gtg ctg gca gga ctg gct ttt			4246
Ala Leu Ala Ala Ala Gly Leu Val Gly Val Leu Ala Gly Leu Ala Phe			
1365	1370	1375	
cag gag atg gag aac ttc ctt ggt ccg att gca gtt gga gga ctc ctg			4294
Gln Glu Met Glu Asn Phe Leu Gly Pro Ile Ala Val Gly Gly Leu Leu			
1380	1385	1390	
atg atg ctg gtt agc gtg gct ggg agg gtg gat ggg cta gag ctc aag			4342
Met Met Leu Val Ser Val Ala Gly Arg Val Asp Gly Leu Glu Leu Lys			
1395	1400	1405	
aag ctt ggt gaa gtt tca tgg gaa gag gag gcg gag atc agc ggg agt			4390
Lys Leu Gly Glu Val Ser Trp Glu Glu Glu Ala Glu Ile Ser Gly Ser			
1410	1415	1420	
tcc gcc cgc tat gat gtg gca ctc agt gaa caa ggg gag ttc aag ctg			4438
Ser Ala Arg Tyr Asp Val Ala Leu Ser Glu Gln Gly Glu Phe Lys Leu			

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ctt tct gaa gag aaa gtg cca tgg gac cag gtt gtg atg acc tcg ctg				4486
Leu Ser Glu Glu Lys Val Pro Trp Asp Gln Val Val Met Thr Ser Leu				
1445	1450	1455		
gcc ttg gtt ggg gct gcc ctc cat cca ttt gct ctt ctg ctg gtc ctt				4534
Ala Leu Val Gly Ala Ala Leu His Pro Phe Ala Leu Leu Leu Val Leu				
1460	1465	1470		
gct ggg tgg ctg ttt cat gtc agg gga gct agg aga agt ggg gat gtc				4582
Ala Gly Trp Leu Phe His Val Arg Gly Ala Arg Arg Ser Gly Asp Val				
1475	1480	1485		
ttg tgg gat att ccc act cct aag atc atc gag gaa tgt gaa cat ctg				4630
Leu Trp Asp Ile Pro Thr Pro Lys Ile Ile Glu Glu Cys Glu His Leu				
1490	1495	1500		
gag gat ggg att tat ggc ata ttc cag tca acc ttc ttg ggg gcc tcc				4678
Glu Asp Gly Ile Tyr Gly Ile Phe Gln Ser Thr Phe Leu Gly Ala Ser				
1505	1510	1515	1520	
cag cga gga gtg gga gtg gca cag gga ggg gtg ttc cac aca atg tgg				4726
Gln Arg Gly Val Gly Val Ala Gln Gly Val Phe His Thr Met Trp				
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cat gtc aca aga gga gct ttc ctt gtc agg aat ggc aag aag ttg att				4774
His Val Thr Arg Gly Ala Phe Leu Val Arg Asn Gly Lys Lys Leu Ile				
1540	1545	1550		
cca tct tgg gct tca gta aag gaa gac ctt gtc gcc tat ggt ggc tca				4822
Pro Ser Trp Ala Ser Val Lys Glu Asp Leu Val Ala Tyr Gly Ser				
1555	1560	1565		
tgg aag ttg gaa ggc aga tgg gat gga gag gaa gag gtc cag ttg atc				4870
Trp Lys Leu Glu Gly Arg Trp Asp Gly Glu Glu Val Gln Leu Ile				
1570	1575	1580		
gcg gct gtt cca gga aag aac gtg gtc aac gtc cag aca aaa ccg agc				4918
Ala Ala Val Pro Gly Lys Asn Val Val Asn Val Gln Thr Lys Pro Ser				
1585	1590	1595	1600	
ttg ttc aaa gtg agg aat ggg gga gaa atc ggg gct gtc gct ctt gac				4966
Leu Phe Lys Val Arg Asn Gly Glu Ile Gly Ala Val Ala Leu Asp				
1605	1610	1615		
tat ccg agt ggc act tca gga tct cct att gtt aac agg aac gga gag				5014
Tyr Pro Ser Gly Thr Ser Gly Ser Pro Ile Val Asn Arg Asn Gly Glu				
1620	1625	1630		
gtg att ggg ctg tac ggc aat ggc atc ctt gtc ggt gac aac tcc ttc				5062
Val Ile Gly Leu Tyr Gly Asn Gly Ile Leu Val Gly Asp Asn Ser Phe				
1635	1640	1645		
gtg tcc gcc ata tcc cag act gag gtg aag gaa gga aag gag gag				5110
Val Ser Ala Ile Ser Gln Thr Glu Val Lys Glu Gly Lys Glu Glu				

1650	1655	1660	
ctc caa gag atc ccg aca atg cta aag aaa gga atg aca act gtc ctt			5158
Leu Gln Glu Ile Pro Thr Met Leu Lys Lys Gly Met Thr Thr Val Leu			
1665 1670 1675 1680			
gat ttt cat cct gga gct ggg aag aca aga cgt ttc ctc cca cag atc			5206
Asp Phe His Pro Gly Ala Gly Lys Thr Arg Arg Phe Leu Pro Gln Ile			
1685 1690 1695			
ttg gcc gag tgc gca cgg aga cgc ttg cgc act ctt gtg ttg gcc ccc			5254
Leu Ala Glu Cys Ala Arg Arg Arg Leu Arg Thr Leu Val Leu Ala Pro			
1700 1705 1710			
acc agg gtt gtt ctt tct gaa atg aag gag gct ttt cac ggc ctg gac			5302
Thr Arg Val Val Leu Ser Glu Met Lys Glu Ala Phe His Gly Leu Asp			
1715 1720 1725			
gtg aaa ttc cac aca cag gct ttt tcc gct cac ggc agc ggg aga gaa			5350
Val Lys Phe His Thr Gln Ala Phe Ser Ala His Gly Ser Gly Arg Glu			
1730 1735 1740			
gtc att gat gct atg tgc cat gcc acc cta act tac agg atg ttg gaa			5398
Val Ile Asp Ala Met Cys His Ala Thr Leu Thr Tyr Arg Met Leu Glu			
1745 1750 1755 1760			
cca act agg gtt gtt aac tgg gaa gtg atc att atg gat gaa gcc cat			5446
Pro Thr Arg Val Val Asn Trp Glu Val Ile Ile Met Asp Glu Ala His			
1765 1770 1775			
ttt ttg gat cca gct agc ata gcc gct aga ggt tgg gca gcg cac aga			5494
Phe Leu Asp Pro Ala Ser Ile Ala Ala Arg Gly Trp Ala Ala His Arg			
1780 1785 1790			
gct agg gca aat gaa agt gca aca atc ttg atg aca gcc aca ccc cct			5542
Ala Arg Ala Asn Glu Ser Ala Thr Ile Leu Met Thr Ala Thr Pro Pro			
1795 1800 1805			
ggg act agt gat gaa ttt cca cat tca aat ggt gaa ata gaa gat gtt			5590
Gly Thr Ser Asp Glu Phe Pro His Ser Asn Gly Glu Ile Glu Asp Val			
1810 1815 1820			
caa acg gac ata ccc agt gag ccc tgg aac aca ggg cat gac tgg atc			5638
Gln Thr Asp Ile Pro Ser Glu Pro Trp Asn Thr Gly His Asp Trp Ile			
1825 1830 1835 1840			
ctg gct gac aaa agg ccc acg gca tgg ttc ctt cca tcc atc aga gct			5686
Leu Ala Asp Lys Arg Pro Thr Ala Trp Phe Leu Pro Ser Ile Arg Ala			
1845 1850 1855			
gca aat gtc atg gct gcc tct ttg cgt aag gct gga aag agt gtg gtg			5734
Ala Asn Val Met Ala Ala Ser Leu Arg Lys Ala Gly Lys Ser Val Val			
1860 1865 1870			
gtc ctg aac agg aaa acc ttt gag aga gaa tac ccc acg ata aag cag			5782
Val Leu Asn Arg Lys Thr Phe Glu Arg Glu Tyr Pro Thr Ile Lys Gln			

1875	1880	1885	
aag aaa cct gac ttt ata ttg gcc act gac ata gct gaa atg gga gcc Lys Lys Pro Asp Phe Ile Leu Ala Thr Asp Ile Ala Glu Met Gly Ala 1890	1895	1900	5830
aac ctt tgc gtg gag cga gtg ctg gat tgc agg acg gct ttt aag cct Asn Leu Cys Val Glu Arg Val Leu Asp Cys Arg Thr Ala Phe Lys Pro 1905	1910	1915	5878
gtg ctt gtg gat gaa ggg agg aag gtg gca ata aaa ggg cca ctt cgt Val Leu Val Asp Glu Gly Arg Lys Val Ala Ile Lys Gly Pro Leu Arg 1925	1930	1935	5926
atc tcc gca tcc tct gct gct caa agg agg ggg cgc att ggg aga aat Ile Ser Ala Ser Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg Asn 1940	1945	1950	5974
ccc aac aga gat gga gac tca tac tac tat tct gag cct aca agt gaa Pro Asn Arg Asp Gly Asp Ser Tyr Tyr Ser Glu Pro Thr Ser Glu 1955	1960	1965	6022
aat aat gcc cac cac gtc tgc tgg ttg gag gcc tca atg ctc ttg gac Asn Asn Ala His His Val Cys Trp Leu Glu Ala Ser Met Leu Leu Asp 1970	1975	1980	6070
aac atg gag gtg agg ggt gga atg gtc gcc cca ctc tat ggc gtt gaa Asn Met Glu Val Arg Gly Met Val Ala Pro Leu Tyr Gly Val Glu 1985	1990	1995	6118
gga act aaa aca cca gtt tcc cct ggt gaa atg aga ctg agg gat gac Gly Thr Lys Thr Pro Val Ser Pro Gly Glu Met Arg Leu Arg Asp Asp 2005	2010	2015	6166
cag agg aaa gtc ttc aga gaa cta gtg agg aat tgt gac ctg ccc gtt Gln Arg Lys Val Phe Arg Glu Leu Val Arg Asn Cys Asp Leu Pro Val 2020	2025	2030	6214
tgg ctt tcg tgg caa gtg gcc aag gct ggt ttg aag acg aat gat cgt Trp Leu Ser Trp Gln Val Ala Lys Ala Gly Leu Lys Thr Asn Asp Arg 2035	2040	2045	6262
aag tgg tgt ttt gaa ggc cct gag gaa cat gag atc ttg aat gac agc Lys Trp Cys Phe Glu Gly Pro Glu Glu His Glu Ile Leu Asn Asp Ser 2050	2055	2060	6310
ggt gaa aca gtg aag tgc agg gct cct gga gga gca aag aag cct ctg Gly Glu Thr Val Lys Cys Arg Ala Pro Gly Gly Ala Lys Lys Pro Leu 2065	2070	2075	6358
cgc cca agg tgg tgt gat gaa agg gtg tca tct gac cag agt ggc ctg Arg Pro Arg Trp Cys Asp Glu Arg Val Ser Ser Asp Gln Ser Ala Leu 2085	2090	2095	6406
tct gaa ttt att aag ttt gct gaa ggt agg agg gga gct gct gaa gtg Ser Glu Phe Ile Lys Phe Ala Glu Gly Arg Arg Gly Ala Ala Glu Val			6454

2100	2105	2110	
ctt gtt gtg ctg agt gaa ctc cct gat ttc ctg gct aaa aaa ggt gga			6502
Leu Val Val Leu Ser Glu Leu Pro Asp Phe Leu Ala Lys Lys Gly Gly			
2115	2120	2125	
gag gca atg gat acc atc agt gtg ttt ctc cac tct gag gaa ggc tct			6550
Glu Ala Met Asp Thr Ile Ser Val Phe Leu His Ser Glu Glu Gly Ser			
2130	2135	2140	
agg gct tac cgc aat gca cta tca atg atg cct gag gca atg aca ata			6598
Arg Ala Tyr Arg Asn Ala Leu Ser Met Met Pro Glu Ala Met Thr Ile			
2145	2150	2155	2160
gtc atg ctg ttt ata ctg gct gga ctc ctg aca tcg gga atg gtc atc			6646
Val Met Leu Phe Ile Leu Ala Gly Leu Leu Thr Ser Gly Met Val Ile			
2165	2170	2175	
ttt ttc atg tct ccc aaa ggc atc agt aga atg tct atg gcg atg ggc			6694
Phe Phe Met Ser Pro Lys Gly Ile Ser Arg Met Ser Met Ala Met Gly			
2180	2185	2190	
aca atg gcc ggc tgt gga tat ctc atg ttc ctt gga ggc gtc aaa ccc			6742
Thr Met Ala Gly Cys Gly Tyr Leu Met Phe Leu Gly Gly Val Lys Pro			
2195	2200	2205	
act cac atc tcc tat atc atg ctc ata ttc ttt gtc ctg atg gtg gtt			6790
Thr His Ile Ser Tyr Ile Met Leu Ile Phe Phe Val Leu Met Val Val			
2210	2215	2220	
gtg atc ccc gag cca ggg caa caa agg tcc atc caa gac aac caa gtg			6838
Val Ile Pro Glu Pro Gly Gln Arg Ser Ile Gln Asp Asn Gln Val			
2225	2230	2235	2240
gca tac ctc att att ggc atc ctg acg ctg gtt tca gcg gtg gca gcc			6886
Ala Tyr Leu Ile Ile Gly Ile Leu Thr Leu Val Ser Ala Val Ala Ala			
2245	2250	2255	
aac gag cta ggc atg ctg gag aaa acc aaa gag gac ctc ttt ggg aag			6934
Asn Glu Leu Gly Met Leu Glu Lys Thr Lys Glu Asp Leu Phe Gly Lys			
2260	2265	2270	
aag aac tta att cca tct agt gct tca ccc tgg agt tgg ccg gat ctt			6982
Lys Asn Leu Ile Pro Ser Ser Ala Ser Pro Trp Ser Trp Pro Asp Leu			
2275	2280	2285	
gac ctg aag cca gga gct gcc tgg aca gtg tac gtt ggc att gtt aca			7030
Asp Leu Lys Pro Gly Ala Ala Trp Thr Val Tyr Val Gly Ile Val Thr			
2290	2295	2300	
atg ctc tct cca atg ttg cac cac tgg atc aaa gtc gaa tat ggc aac			7078
Met Leu Ser Pro Met Leu His His Trp Ile Lys Val Glu Tyr Gly Asn			
2305	2310	2315	2320
ctg tct ctg tct gga ata gcc cag tca gcc tca gtc ctt tct ttc atg			7126
Leu Ser Leu Ser Gly Ile Ala Gln Ser Ala Ser Val Leu Ser Phe Met			

2325	2330	2335	
gac aag ggg ata cca ttc atg aag atg aat atc tcg gtc ata atg ctg Asp Lys Gly Ile Pro Phe Met Lys Met Asn Ile Ser Val Ile Met Leu 2340	2345	2350	7174
ctg gtc agt ggc tgg aat tca ata aca gtg atg cct ctg ctc tgt ggc Leu Val Ser Gly Trp Asn Ser Ile Thr Val Met Pro Leu Leu Cys Gly 2355	2360	2365	7222
ata ggg tgc gcc atg ctc cac tgg tct ctc att tta cct gga atc aaa Ile Gly Cys Ala Met Leu His Trp Ser Leu Ile Leu Pro Gly Ile Lys 2370	2375	2380	7270
gcg cag cag tca aag ctt gca cag aga agg gtg ttc cat ggc gtt gcc Ala Gln Gln Ser Lys Leu Ala Gln Arg Arg Val Phe His Gly Val Ala 2385	2390	2395	7318
aag aac cct gtg gtt gat ggg aat cca aca gtt gac att gag gaa gct Lys Asn Pro Val Val Asp Gly Asn Pro Thr Val Asp Ile Glu Glu Ala 2405	2410	2415	7366
cct gaa atg cct gcc ctt tat gag aag aaa ctg gct cta tat ctc ctt Pro Glu Met Pro Ala Leu Tyr Glu Lys Lys Leu Ala Leu Tyr Leu Leu 2420	2425	2430	7414
ctt gct ctc agc cta gct tct gtt gcc atg tgc aga acg ccc ttt tca Leu Ala Leu Ser Leu Ala Ser Val Ala Met Cys Arg Thr Pro Phe Ser 2435	2440	2445	7462
ttg gct gaa ggc att gtc cta gca tca gct gcc tca ggg ccg ctc ata Leu Ala Glu Gly Ile Val Leu Ala Ser Ala Ala Ser Gly Pro Leu Ile 2450	2455	2460	7510
gag gga aac acc agc ctt ctt tgg aat gga ccc atg gct gtc tcc atg Glu Gly Asn Thr Ser Leu Leu Trp Asn Gly Pro Met Ala Val Ser Met 2465	2470	2475	7558
aca gga gtc atg agg ggg aat cac tat gct ttt gtg gga gtc atg tac Thr Gly Val Met Arg Gly Asn His Tyr Ala Phe Val Gly Val Met Tyr 2485	2490	2495	7606
aat cta tgg aag atg aaa act gga cgc cgg ggg agc gcg aat gga aaa Asn Leu Trp Lys Met Lys Thr Gly Arg Arg Gly Ser Ala Asn Gly Lys 2500	2505	2510	7654
act ttg ggt gaa gtc tgg aag agg gaa ctg aat ctg ttg gac aag cga Thr Leu Gly Glu Val Trp Lys Arg Glu Leu Asn Leu Leu Asp Lys Arg 2515	2520	2525	7702
cag ttt gag ttg tat aaa agg acc gac att gtg gag gtg gat cgt gat Gln Phe Glu Leu Tyr Lys Arg Thr Asp Ile Val Glu Val Asp Arg Asp 2530	2535	2540	7750
acg gca cgc agg cat ttg gcc gaa ggg aag gtg gac acc ggg gtg gcg Thr Ala Arg Arg His Leu Ala Glu Gly Lys Val Asp Thr Gly Val Ala 2545			7798

2545	2550	2555	2560	
gtc tcc agg ggg acc gca aag tta agg tgg ttc cat gag cgt ggc tat				7846
Val Ser Arg Gly Thr Ala Lys Leu Arg Trp Phe His Glu Arg Gly Tyr				
2565	2570	2575		
gtc aag ctg gaa ggt agg gtg att gac ctg ggg tgt ggc cgc gga ggc				7894
Val Lys Leu Glu Gly Arg Val Ile Asp Leu Gly Cys Gly Arg Gly Gly				
2580	2585	2590		
tgg tgt tac tac gct gct gcg caa aag gaa gtg agt ggg gtc aaa gga				7942
Trp Cys Tyr Tyr Ala Ala Ala Gln Lys Glu Val Ser Gly Val Lys Gly				
2595	2600	2605		
ttt act ctt gga aga gac ggc cat gag aaa ccc atg aat gtg caa agt				7990
Phe Thr Leu Gly Arg Asp Gly His Glu Lys Pro Met Asn Val Gln Ser				
2610	2615	2620		
ctg gga tgg aac atc atc acc ttc aag gac aaa act gat atc cac cgc				8038
Leu Gly Trp Asn Ile Ile Thr Phe Lys Asp Lys Thr Asp Ile His Arg				
2625	2630	2635	2640	
cta gaa cca gtg aaa tgt gac acc ctt ttg tgt gac att gga gag tca				8086
Leu Glu Pro Val Lys Cys Asp Thr Leu Leu Cys Asp Ile Gly Glu Ser				
2645	2650	2655		
tca tcg tca tcg gtc aca gag ggg gaa agg acc gtg aga gtt ctt gat				8134
Ser Ser Ser Val Thr Glu Gly Glu Arg Thr Val Arg Val Leu Asp				
2660	2665	2670		
act gta gaa aaa tgg ctg gct tgt ggg gtt gac aac ttc tgt gtg aag				8182
Thr Val Glu Lys Trp Leu Ala Cys Gly Val Asp Asn Phe Cys Val Lys				
2675	2680	2685		
gtg tta gct cca tac atg cca gat gtt ctc gag aaa ctg gaa ttg ctc				8230
Val Leu Ala Pro Tyr Met Pro Asp Val Leu Glu Lys Leu Glu Leu Leu				
2690	2695	2700		
caa agg agg ttt ggc gga aca gtg atc agg aac cct ctc tcc agg aat				8278
Gln Arg Arg Phe Gly Gly Thr Val Ile Arg Asn Pro Leu Ser Arg Asn				
2705	2710	2715	2720	
tcc act cat gaa atg tac tac gtg tct gga gcc cgc agc aat gtc aca				8326
Ser Thr His Glu Met Tyr Tyr Val Ser Gly Ala Arg Ser Asn Val Thr				
2725	2730	2735		
ttt act gtg aac caa aca tcc cgc ctc ctg atg agg aga atg agg cgt				8374
Phe Thr Val Asn Gln Thr Ser Arg Leu Leu Met Arg Arg Met Arg Arg				
2740	2745	2750		
cca act gga aaa gtg acc ctg gag gct gac gtc atc ctc cca att ggg				8422
Pro Thr Gly Lys Val Thr Leu Glu Ala Asp Val Ile Leu Pro Ile Gly				
2755	2760	2765		
aca cgc agt gtt gag aca gac aag gga ccc ctg gac aaa gag gcc ata				8470
Thr Arg Ser Val Glu Thr Asp Lys Gly Pro Leu Asp Lys Glu Ala Ile				

2770	2775	2780	
gaa gaa agg gtt gag agg ata aaa tct gag tac atg acc tct tgg ttt Glu Glu Arg Val Glu Arg Ile Lys Ser Glu Tyr Met Thr Ser Trp Phe 2785 2790 2795 2800			8518
tat gac aat gac aac ccc tac agg acc tgg cac tac tgt ggc tcc tat Tyr Asp Asn Asp Asn Pro Tyr Arg Thr Trp His Tyr Cys Gly Ser Tyr 2805 2810 2815			8566
gtc aca aaa acc tca gga agt gcg gcg agc atg gta aat ggt gtt att Val Thr Lys Thr Ser Gly Ser Ala Ala Ser Met Val Asn Gly Val Ile 2820 2825 2830			8614
aaa att ctg aca tat cca tgg gac agg ata gag gag gtc aca aga atg Lys Ile Leu Thr Tyr Pro Trp Asp Arg Ile Glu Glu Val Thr Arg Met 2835 2840 2845			8662
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aaa gtt gac acc aga gca aag gat cca cca gcg gga act agg aag atc Lys Val Asp Thr Arg Ala Lys Asp Pro Pro Ala Gly Thr Arg Lys Ile 2865 2870 2875 2880			8758
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aac ccc aga ctg tgc aca aag gaa ttt att gca aaa gtc cga agt Asn Pro Arg Leu Cys Thr Lys Glu Glu Phe Ile Ala Lys Val Arg Ser 2900 2905 2910			8854
cat gca gcc att gga gct tac ctg gaa gaa caa gaa cag tgg aag act His Ala Ala Ile Gly Ala Tyr Leu Glu Glu Gln Trp Lys Thr 2915 2920 2925			8902
gcc aat gag gct gtc caa gac cca aag ttc tgg gaa ctg gtg gat gaa Ala Asn Glu Ala Val Gln Asp Pro Lys Phe Trp Glu Leu Val Asp Glu 2930 2935 2940			8950
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gga agc cgt gcc ata tgg tat atg tgg ctg gga gcg cgg tat ctt gag Gly Ser Arg Ala Ile Trp Tyr Met Trp Leu Gly Ala Arg Tyr Leu Glu 2980 2985 2990			9094
ttt gag gcc ctg gga ttc ctg aat gag gac cat tgg gct tcc agg gaa Phe Glu Ala Leu Gly Phe Leu Asn Glu Asp His Trp Ala Ser Arg Glu			9142

2995	3000	3005	
aac tca gga gga gga gtg gaa ggc att ggc tta caa tac cta gga tat			9190
Asn Ser Gly Gly Gly Val Glu Gly Ile Gly Leu Gln Tyr Leu Gly Tyr			
3010	3015	3020	
gtg atc aga gac ctg gct gca atg gat ggt ggt gga ttc tac gcg gat			9238
Val Ile Arg Asp Leu Ala Ala Met Asp Gly Gly Phe Tyr Ala Asp			
3025	3030	3035	3040
gac acc gct gga tgg gac acg cgc atc aca gag gca gac ctt gat gat			9286
Asp Thr Ala Gly Trp Asp Thr Arg Ile Thr Glu Ala Asp Leu Asp Asp			
3045	3050	3055	
gaa cag gag atc ttg aac tac atg agc cca cat cac aaa aaa ctg gca			9334
Glu Gln Glu Ile Leu Asn Tyr Met Ser Pro His His Lys Lys Leu Ala			
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caa gca gtg atg gaa atg aca tac aag aac aaa gtg gtg aaa gtg ttg			9382
Gln Ala Val Met Glu Met Thr Tyr Lys Asn Lys Val Val Lys Val Leu			
3075	3080	3085	
aga cca gcc cca gga ggg aaa gcc tac atg gat gtc ata agt cga cga			9430
Arg Pro Ala Pro Gly Gly Ala Tyr Met Asp Val Ile Ser Arg Arg			
3090	3095	3100	
gac cag aga gga tcc ggg cag gta gtg act tat gct ctg aac acc atc			9478
Asp Gln Arg Gly Ser Gly Gln Val Val Thr Tyr Ala Leu Asn Thr Ile			
3105	3110	3115	3120
acc aac ttg aaa gtc caa ttg atc aga atg gca gaa gca gag atg gtg			9526
Thr Asn Leu Lys Val Gln Leu Ile Arg Met Ala Glu Ala Glu Met Val			
3125	3130	3135	
ata cat cac caa cat gtt caa gat tgt gat gaa tca gtt ctg acc agg			9574
Ile His His Gln His Val Gln Asp Cys Asp Glu Ser Val Leu Thr Arg			
3140	3145	3150	
ctg gag gca tgg ctc act gag cac gga tgt aac aga ctg aag agg atg			9622
Leu Glu Ala Trp Leu Thr Glu His Gly Cys Asn Arg Leu Lys Arg Met			
3155	3160	3165	
gcg gtg agt gga gac gac tgt gtg gtc cgg ccc atc gat gac agg ttc			9670
Ala Val Ser Gly Asp Asp Cys Val Val Arg Pro Ile Asp Asp Arg Phe			
3170	3175	3180	
ggc ctg gcc ctg tcc cat ctc aac gcc atg tcc aag gtt aga aag gac			9718
Gly Leu Ala Leu Ser His Leu Asn Ala Met Ser Lys Val Arg Lys Asp			
3185	3190	3195	3200
ata tct gaa tgg cag cca tca aaa ggg tgg aat gat tgg gag aat gtg			9766
Ile Ser Glu Trp Gln Pro Ser Lys Gly Trp Asn Asp Trp Glu Asn Val			
3205	3210	3215	
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Pro Phe Cys Ser His His Phe His Glu Leu Gln Leu Lys Asp Gly Arg			

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3235	3240	3245	
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3250	3255	3260	
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3265	3270	3275	3280
gac atg agg cta ctg tca ttg gct gtt tcc tca gct gtt ccc acc tca Asp Met Arg Leu Leu Ser Leu Ala Val Ser Ser Ala Val Pro Thr Ser	10006		
3285	3290	3295	
tgg gtt cca caa gga cgc aca aca tgg tcg att cat ggg aaa ggg gag Trp Val Pro Gln Gly Arg Thr Thr Trp Ser Ile His Gly Lys Gly Glu	10054		
3300	3305	3310	
tgg atg acc acg gaa gac atg ctt gag gtc tgg aac aga gta tgg ata Trp Met Thr Thr Glu Asp Met Leu Glu Val Trp Asn Arg Val Trp Ile	10102		
3315	3320	3325	
acc aac aac cca cac atg cag gac aag aca atg gtc aaa aaa tgg aga Thr Asn Asn Pro His Met Gln Asp Lys Thr Met Val Lys Lys Trp Arg	10150		
3330	3335	3340	
gat gtc cct tat cta acc aag aga caa gac aag ctg tgc gga tca ctg Asp Val Pro Tyr Leu Thr Lys Arg Gln Asp Lys Leu Cys Gly Ser Leu	10198		
3345	3350	3355	3360
att gga atg acc aat agg gcc acc tgg gcc tcc cac atc cat tta gtc Ile Gly Met Thr Asn Arg Ala Thr Trp Ala Ser His Ile His Leu Val	10246		
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atc cat cgt atc cga acg ctg att gga cag gag aaa tac act gac tac Ile His Arg Ile Arg Thr Leu Ile Gly Gln Glu Lys Tyr Thr Asp Tyr	10294		
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cta aca gtc atg gac agg tat tct gtc gat gct gac ctg caa ctg ggt Leu Thr Val Met Asp Arg Tyr Ser Val Asp Ala Asp Leu Gln Leu Gly	10342		
3395	3400	3405	
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 Gln Ile Gly Asn Arg Pro Gly Pro Ser Arg Gly Val Gln Gly Phe Ile
 35 40 45
 Phe Phe Phe Leu Phe Asn Ile Leu Thr Gly Lys Lys Ile Thr Ala His
 50 55 60
 Leu Lys Arg Leu Trp Lys Met Leu Asp Pro Arg Gln Gly Leu Ala Val
 65 70 75 80
 Leu Arg Lys Val Lys Arg Val Val Ala Ser Leu Met Arg Gly Leu Ser
 85 90 95
 Ser Arg Lys Arg Arg Ser His Asp Val Leu Thr Val Gln Phe Leu Ile
 100 105 110
 Leu Gly Met Leu Leu Met Thr Gly Gly Val Thr Leu Val Arg Lys Asn
 115 120 125
 Arg Trp Leu Leu Leu Asn Val Thr Ser Glu Asp Leu Gly Lys Thr Phe
 130 135 140
 Ser Val Gly Thr Gly Asn Cys Thr Thr Asn Ile Leu Glu Ala Lys Tyr
 145 150 155 160
 Trp Cys Pro Asp Ser Met Glu Tyr Asn Cys Pro Asn Leu Ser Pro Arg
 165 170 175
 Glu Glu Pro Asp Asp Ile Asp Cys Trp Cys Tyr Gly Val Glu Asn Val
 180 185 190
 Arg Val Ala Tyr Gly Lys Cys Asp Ser Ala Gly Arg Ser Arg Arg Ser
 195 200 205

Met His His Leu Val Glu Phe Glu Pro Pro His Ala Ala Thr Ile Arg
515 520 525

Val Leu Ala Leu Gly Asn Gln Glu Gly Ser Leu Lys Thr Ala Leu Thr
530 535 540

Gly Ala Met Arg Val Thr Lys Asp Thr Asn Asp Asn Asn Leu Tyr Lys
545 550 555 560

Leu His Gly His Val Ser Cys Arg Val Lys Leu Ser Ala Leu Thr
565 570 575

Leu Lys Gly Thr Ser Tyr Lys Ile Cys Thr Asp Lys Met Phe Phe Val
580 585 590

Lys Asn Pro Thr Asp Thr Gly His Gly Thr Val Val Met Gln Val Lys
595 600 605

Val Ser Lys Gly Ala Pro Cys Arg Ile Pro Val Ile Val Ala Asp Asp
610 615 620

Leu Thr Ala Ala Ile Asn Lys Gly Ile Leu Val Thr Val Asn Pro Ile
625 630 635 640

Ala Ser Thr Asn Asp Asp Glu Val Leu Ile Glu Val Asn Pro Pro Phe
645 650 655

Gly Asp Ser Tyr Ile Ile Val Gly Arg Gly Asp Ser Arg Leu Thr Tyr
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Gln Trp His Lys Glu Gly Ser Ser Ile Gly Lys Leu Phe Thr Gln Thr
675 680 685

Met Lys Gly Val Glu Arg Leu Ala Val Met Gly Asp Thr Ala Trp Asp
690 695 700

Phe Ser Ser Ala Gly Gly Phe Phe Thr Ser Val Gly Lys Gly Ile His
705 710 715 720

Thr Val Phe Gly Ser Ala Phe Gln Gly Leu Phe Gly Gly Leu Asn Trp
725 730 735

Ile Thr Lys Val Ile Met Gly Ala Val Leu Ile Trp Val Gly Ile Asn
740 745 750

Thr Arg Asn Met Thr Met Ser Met Ser Met Ile Leu Val Gly Val Ile
755 760 765

Met Met Phe Leu Ser Leu Gly Val Gly Ala Asp Gln Gly Cys Ala Ile
770 775 780

Asn Phe Gly Lys Arg Glu Leu Lys Cys Gly Asp Gly Ile Phe Ile Phe
785 790 795 800

Arg Asp Ser Asp Asp Trp Leu Asn Lys Tyr Ser Tyr Tyr Pro Glu Asp

20

805

810

815

Pro Val Lys Leu Ala Ser Ile Val Lys Ala Ser Phe Glu Glu Gly Lys
820 825 830

Cys Gly Leu Asn Ser Val Asp Ser Leu Glu His Glu Met Trp Arg Ser
835 840 845

Arg Ala Asp Glu Ile Asn Ala Ile Phe Glu Glu Asn Glu Val Asp Ile
850 855 860

Ser Val Val Val Gln Asp Pro Lys Asn Val Tyr Gln Arg Gly Thr His
865 870 875 880

Pro Phe Ser Arg Ile Arg Asp Gly Leu Gln Tyr Gly Trp Lys Thr Trp
885 890 895

Gly Lys Asn Leu Val Phe Ser Pro Gly Arg Lys Asn Gly Ser Phe Ile
900 905 910

Ile Asp Gly Lys Ser Arg Lys Glu Cys Pro Phe Ser Asn Arg Val Trp
915 920 925

Asn Ser Phe Gln Ile Glu Glu Phe Gly Thr Gly Val Phe Thr Thr Arg
930 935 940

Val Tyr Met Asp Ala Val Phe Glu Tyr Thr Ile Asp Cys Asp Gly Ser
945 950 955 960

Ile Leu Gly Ala Ala Val Asn Gly Lys Ser Ala His Gly Ser Pro
965 970 975

Thr Phe Trp Met Gly Ser His Glu Val Asn Gly Thr Trp Met Ile His
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995 1000 1005

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1010 1015 1020

Ile Gly Gly Pro Val Ser Ser His Asn His Ile Pro Gly Tyr Lys Val
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Ala Cys Pro Gly Thr Ser Val Ile Ile Asp Gly Asn Cys Asp Gly Arg
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Trp Cys Cys Arg Ser Cys Thr Met Pro Pro Val Ser Phe His Gly Ser
1090 1095 1100

Arg Arg Ala Ile Asp Leu Pro Thr His Glu Asn His Gly Leu Lys Thr
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Arg Gln Glu Lys Trp Met Thr Gly Arg Met Gly Glu Arg Gln Leu Gln
225 230 235 240

Lys Ile Glu Arg Trp Phe Val Arg Asn Pro Phe Phe Ala Val Thr Ala
245 250 255

Leu Thr Ile Ala Tyr Leu Val Gly Ser Asn Met Thr Gln Arg Val Val
260 265 270

Ile Ala Leu Leu Val Leu Ala Val Gly Pro Ala Tyr Ser Ala His Cys
275 280 285

Ile Gly Ile Thr Asp Arg Asp Phe Ile Glu Gly Val His Gly Gly Thr
290 295 300

Trp Val Ser Ala Thr Leu Glu Gln Asp Lys Cys Val Thr Val Met Ala
305 310 315 320

Pro Asp Lys Pro Ser Leu Asp Ile Ser Leu Glu Thr Val Ala Ile Asp
325 330 335

Arg Pro Ala Glu Val Arg Lys Val Cys Tyr Asn Ala Val Leu Thr His
340 345 350

Val Lys Ile Asn Asp Lys Cys Pro Ser Thr Gly Glu Ala His Leu Ala
355 360 365

Glu Glu Asn Glu Gly Asp Asn Ala Cys Lys Arg Thr Tyr Ser Asp Arg
370 375 380

Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Ser Ile Val Ala
385 390 395 400

Cys Ala Lys Phe Thr Cys Ala Lys Ser Met Ser Leu Phe Glu Val Asp
405 410 415

Gln Thr Lys Ile Gln Tyr Val Ile Arg Ala Gln Leu His Val Gly Ala
420 425 430

Lys Gln Glu Asn Trp Thr Asp Ile Lys Thr Leu Lys Phe Asp Ala
435 440 445

Leu Ser Gly Ser Gln Glu Val Glu Phe Ile Gly Tyr Gly Lys Ala Thr
450 455 460

Leu Glu Cys Gln Val Gln Thr Ala Val Asp Phe Gly Asn Ser Tyr Ile
465 470 475 480

Ala Glu Met Glu Thr Glu Ser Trp Ile Val Asp Arg Gln Trp Ala Gln
485 490 495

Asp Leu Thr Leu Pro Trp Gln Ser Gly Ser Gly Val Trp Arg Glu
500 505 510

Met His His Leu Val Glu Phe Glu Pro Pro His Ala Ala Thr Ile Arg
515 520 525

Val Leu Ala Leu Gly Asn Gln Glu Gly Ser Leu Lys Thr Ala Leu Thr
530 535 540

Gly Ala Met Arg Val Thr Lys Asp Thr Asn Asp Asn Asn Leu Tyr Lys
545 550 555 560

Leu His Gly Gly His Val Ser Cys Arg Val Lys Leu Ser Ala Leu Thr
565 570 575

Leu Lys Gly Thr Ser Tyr Lys Ile Cys Thr Asp Lys Met Phe Phe Val
580 585 590

Lys Asn Pro Thr Asp Thr Gly His Gly Thr Val Val Met Gln Val Lys
595 600 605

Val Ser Lys Gly Ala Pro Cys Arg Ile Pro Val Ile Val Ala Asp Asp
610 615 620

Leu Thr Ala Ala Ile Asn Lys Gly Ile Leu Val Thr Val Asn Pro Ile
625 630 635 640

Ala Ser Thr Asn Asp Asp Glu Val Leu Ile Glu Val Asn Pro Pro Phe
645 650 655

Gly Asp Ser Tyr Ile Ile Val Gly Arg Gly Asp Ser Arg Leu Thr Tyr
660 665 670

Gln Trp His Lys Glu Gly Ser Ser Ile Gly Lys Leu Phe Thr Gln Thr
675 680 685

Met Lys Gly Val Glu Arg Leu Ala Val Met Gly Asp Thr Ala Trp Asp
690 695 700

Phe Ser Ser Ala Gly Gly Phe Phe Thr Ser Val Gly Lys Gly Ile His
705 710 715 720

Thr Val Phe Gly Ser Ala Phe Gln Gly Leu Phe Gly Gly Leu Asn Trp
725 730 735

Ile Thr Lys Val Ile Met Gly Ala Val Leu Ile Trp Val Gly Ile Asn
740 745 750

Thr Arg Asn Met Thr Met Ser Met Ser Met Ile Leu Val Gly Val Ile
755 760 765

Met Met Phe Leu Ser Leu Gly Val Gly Ala Asp Gln Gly Cys Ala Ile
770 775 780

Asn Phe Gly Lys Arg Glu Leu Lys Cys Gly Asp Gly Ile Phe Ile Phe
785 790 795 800

Arg Asp Ser Asp Asp Trp Leu Asn Lys Tyr Ser Tyr Tyr Pro Glu Asp

20

805

810

815

Pro Val Lys Leu Ala Ser Ile Val Lys Ala Ser Phe Glu Glu Gly Lys
820 825 830

Cys Gly Leu Asn Ser Val Asp Ser Leu Glu His Glu Met Trp Arg Ser
835 840 845

Arg Ala Asp Glu Ile Asn Ala Ile Phe Glu Glu Asn Glu Val Asp Ile
850 855 860

Ser Val Val Val Gln Asp Pro Lys Asn Val Tyr Gln Arg Gly Thr His
865 870 875 880

Pro Phe Ser Arg Ile Arg Asp Gly Leu Gln Tyr Gly Trp Lys Thr Trp
885 890 895

Gly Lys Asn Leu Val Phe Ser Pro Gly Arg Lys Asn Gly Ser Phe Ile
900 905 910

Ile Asp Gly Lys Ser Arg Lys Glu Cys Pro Phe Ser Asn Arg Val Trp
915 920 925

Asn Ser Phe Gln Ile Glu Glu Phe Gly Thr Gly Val Phe Thr Thr Arg
930 935 940

Val Tyr Met Asp Ala Val Phe Glu Tyr Thr Ile Asp Cys Asp Gly Ser
945 950 955 960

Ile Leu Gly Ala Ala Val Asn Gly Lys Lys Ser Ala His Gly Ser Pro
965 970 975

Thr Phe Trp Met Gly Ser His Glu Val Asn Gly Thr Trp Met Ile His
980 985 990

Thr Leu Glu Ala Leu Asp Tyr Lys Glu Cys Glu Trp Pro Leu Thr His
995 1000 1005

Thr Ile Gly Thr Ser Val Glu Glu Ser Glu Met Phe Met Pro Arg Ser
1010 1015 1020

Ile Gly Gly Pro Val Ser Ser His Asn His Ile Pro Gly Tyr Lys Val
1025 1030 1035 1040

Gln Thr Asn Gly Pro Trp Met Gln Val Pro Leu Glu Val Lys Arg Glu
1045 1050 1055

Ala Cys Pro Gly Thr Ser Val Ile Ile Asp Gly Asn Cys Asp Gly Arg
1060 1065 1070

Gly Lys Ser Thr Arg Ser Thr Thr Asp Ser Gly Lys Val Ile Pro Glu
1075 1080 1085

Trp Cys Cys Arg Ser Cys Thr Met Pro Pro Val Phe His Gly Ser
1090 1095 1100

Asp Gly Cys Trp Tyr Pro Met Glu Ile Arg Pro Arg Lys Thr His Glu
1105 1110 1115 1120

Ser His Leu Val Arg Ser Trp Val Thr Ala Gly Glu Ile His Ala Val
1125 1130 1135

Pro Phe Gly Leu Val Ser Met Met Ile Ala Met Glu Val Val Leu Arg
1140 1145 1150

Lys Arg Gln Gly Pro Lys Gln Met Leu Val Gly Gly Val Val Leu Leu
1155 1160 1165

Gly Ala Met Leu Val Gly Gln Val Thr Leu Leu Asp Leu Leu Lys Leu
1170 1175 1180

Thr Val Ala Val Gly Leu His Phe His Glu Met Asn Asn Gly Gly Asp
1185 1190 1195 1200

Ala Met Tyr Met Ala Leu Ile Ala Ala Phe Ser Ile Arg Pro Gly Leu
1205 1210 1215

Leu Ile Gly Phe Gly Leu Arg Thr Leu Trp Ser Pro Arg Glu Arg Leu
1220 1225 1230

Val Leu Thr Leu Gly Ala Ala Met Val Glu Ile Ala Leu Gly Gly Val
1235 1240 1245

Met Gly Gly Leu Trp Lys Tyr Leu Asn Ala Val Ser Leu Cys Ile Leu
1250 1255 1260

Thr Ile Asn Ala Val Ala Ser Arg Lys Ala Ser Asn Thr Ile Leu Pro
1265 1270 1275 1280

Leu Met Ala Leu Leu Thr Pro Val Thr Met Ala Glu Val Arg Leu Ala
1285 1290 1295

Ala Met Phe Phe Cys Ala Val Val Ile Ile Gly Val Leu His Gln Asn
1300 1305 1310

Phe Lys Asp Thr Ser Met Gln Lys Thr Ile Pro Leu Val Ala Leu Thr
1315 1320 1325

Leu Thr Ser Tyr Leu Gly Leu Thr Gln Pro Phe Leu Gly Leu Cys Ala
1330 1335 1340

Phe Leu Ala Thr Arg Ile Phe Gly Arg Arg Ser Ile Pro Val Asn Glu
1345 1350 1355 1360

Ala Leu Ala Ala Ala Gly Leu Val Gly Val Leu Ala Gly Leu Ala Phe
1365 1370 1375

Gln Glu Met Glu Asn Phe Leu Gly Pro Ile Ala Val Gly Gly Leu Leu
1380 1385 1390

Met Met Leu Val Ser Val Ala Gly Arg Val Asp Gly Leu Glu Leu Lys
1395 1400 1405

Lys Leu Gly Glu Val Ser Trp Glu Glu Glu Ala Glu Ile Ser Gly Ser
1410 1415 1420

Ser Ala Arg Tyr Asp Val Ala Leu Ser Glu Gln Gly Glu Phe Lys Leu
1425 1430 1435 1440

Leu Ser Glu Glu Lys Val Pro Trp Asp Gln Val Val Met Thr Ser Leu
1445 1450 1455

Ala Leu Val Gly Ala Ala Leu His Pro Phe Ala Leu Leu Leu Val Leu
1460 1465 1470

Ala Gly Trp Leu Phe His Val Arg Gly Ala Arg Arg Ser Gly Asp Val
1475 1480 1485

Leu Trp Asp Ile Pro Thr Pro Lys Ile Ile Glu Glu Cys Glu His Leu
1490 1495 1500

Glu Asp Gly Ile Tyr Gly Ile Phe Gln Ser Thr Phe Leu Gly Ala Ser
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Gln Arg Gly Val Gly Val Ala Gln Gly Gly Val Phe His Thr Met Trp
1525 1530 1535

His Val Thr Arg Gly Ala Phe Leu Val Arg Asn Gly Lys Lys Leu Ile
1540 1545 1550

Pro Ser Trp Ala Ser Val Lys Glu Asp Leu Val Ala Tyr Gly Ser
1555 1560 1565

Trp Lys Leu Glu Gly Arg Trp Asp Gly Glu Glu Val Gln Leu Ile
1570 1575 1580

Ala Ala Val Pro Gly Lys Asn Val Val Asn Val Gln Thr Lys Pro Ser
1585 1590 1595 1600

Leu Phe Lys Val Arg Asn Gly Gly Glu Ile Gly Ala Val Ala Leu Asp
1605 1610 1615

Tyr Pro Ser Gly Thr Ser Gly Ser Pro Ile Val Asn Arg Asn Gly Glu
1620 1625 1630

Val Ile Gly Leu Tyr Gly Asn Gly Ile Leu Val Gly Asp Asn Ser Phe
1635 1640 1645

Val Ser Ala Ile Ser Gln Thr Glu Val Lys Glu Glu Gly Lys Glu Glu
1650 1655 1660

Leu Gln Glu Ile Pro Thr Met Leu Lys Lys Gly Met Thr Thr Val Leu
1665 1670 1675 1680

Asp Phe His Pro Gly Ala Gly Lys Thr Arg Arg Phe Leu Pro Gln Ile
1685 1690 1695

Leu Ala Glu Cys Ala Arg Arg Arg Leu Arg Thr Leu Val Leu Ala Pro

1700	1705	1710
Thr Arg Val Val Leu Ser Glu Met Lys Glu Ala Phe His Gly Leu Asp		
1715	1720	1725
Val Lys Phe His Thr Gln Ala Phe Ser Ala His Gly Ser Gly Arg Glu		
1730	1735	1740
Val Ile Asp Ala Met Cys His Ala Thr Leu Thr Tyr Arg Met Leu Glu		
1745	1750	1755
Pro Thr Arg Val Val Asn Trp Glu Val Ile Ile Met Asp Glu Ala His		
1765	1770	1775
Phe Leu Asp Pro Ala Ser Ile Ala Ala Arg Gly Trp Ala Ala His Arg		
1780	1785	1790
Ala Arg Ala Asn Glu Ser Ala Thr Ile Leu Met Thr Ala Thr Pro Pro		
1795	1800	1805
Gly Thr Ser Asp Glu Phe Pro His Ser Asn Gly Glu Ile Glu Asp Val		
1810	1815	1820
Gln Thr Asp Ile Pro Ser Glu Pro Trp Asn Thr Gly His Asp Trp Ile		
1825	1830	1835
1840		
Leu Ala Asp Lys Arg Pro Thr Ala Trp Phe Leu Pro Ser Ile Arg Ala		
1845	1850	1855
Ala Asn Val Met Ala Ala Ser Leu Arg Lys Ala Gly Lys Ser Val Val		
1860	1865	1870
Val Leu Asn Arg Lys Thr Phe Glu Arg Glu Tyr Pro Thr Ile Lys Gln		
1875	1880	1885
Lys Lys Pro Asp Phe Ile Leu Ala Thr Asp Ile Ala Glu Met Gly Ala		
1890	1895	1900
Asn Leu Cys Val Glu Arg Val Leu Asp Cys Arg Thr Ala Phe Lys Pro		
1905	1910	1915
1920		
Val Leu Val Asp Glu Gly Arg Lys Val Ala Ile Lys Gly Pro Leu Arg		
1925	1930	1935
Ile Ser Ala Ser Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg Asn		
1940	1945	1950
Pro Asn Arg Asp Gly Asp Ser Tyr Tyr Tyr Ser Glu Pro Thr Ser Glu		
1955	1960	1965
Asn Asn Ala His His Val Cys Trp Leu Glu Ala Ser Met Leu Leu Asp		
1970	1975	1980
Asn Met Glu Val Arg Gly Gly Met Val Ala Pro Leu Tyr Gly Val Glu		
1985	1990	1995
2000		

Gly Thr Lys Thr Pro Val Ser Pro Gly Glu Met Arg Leu Arg Asp Asp
2005 2010 2015

Gln Arg Lys Val Phe Arg Glu Leu Val Arg Asn Cys Asp Leu Pro Val
2020 2025 2030

Trp Leu Ser Trp Gln Val Ala Lys Ala Gly Leu Lys Thr Asn Asp Arg
2035 2040 2045

Lys Trp Cys Phe Glu Gly Pro Glu Glu His Glu Ile Leu Asn Asp Ser
2050 2055 2060

Gly Glu Thr Val Lys Cys Arg Ala Pro Gly Gly Ala Lys Lys Pro Leu
2065 2070 2075 2080

Arg Pro Arg Trp Cys Asp Glu Arg Val Ser Ser Asp Gln Ser Ala Leu
2085 2090 2095

Ser Glu Phe Ile Lys Phe Ala Glu Gly Arg Arg Gly Ala Ala Glu Val
2100 2105 2110

Leu Val Val Leu Ser Glu Leu Pro Asp Phe Leu Ala Lys Lys Gly Gly
2115 2120 2125

Glu Ala Met Asp Thr Ile Ser Val Phe Leu His Ser Glu Glu Gly Ser
2130 2135 2140

Arg Ala Tyr Arg Asn Ala Leu Ser Met Met Pro Glu Ala Met Thr Ile
2145 2150 2155 2160

Val Met Leu Phe Ile Leu Ala Gly Leu Leu Thr Ser Gly Met Val Ile
2165 2170 2175

Phe Phe Met Ser Pro Lys Gly Ile Ser Arg Met Ser Met Ala Met Gly
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Thr Met Ala Gly Cys Gly Tyr Leu Met Phe Leu Gly Gly Val Lys Pro
2195 2200 2205

Thr His Ile Ser Tyr Ile Met Leu Ile Phe Phe Val Leu Met Val Val
2210 2215 2220

Val Ile Pro Glu Pro Gly Gln Gln Arg Ser Ile Gln Asp Asn Gln Val
2225 2230 2235 2240

Ala Tyr Leu Ile Ile Gly Ile Leu Thr Leu Val Ser Ala Val Ala Ala
2245 2250 2255

Asn Glu Leu Gly Met Leu Glu Lys Thr Lys Glu Asp Leu Phe Gly Lys
2260 2265 2270

Lys Asn Leu Ile Pro Ser Ser Ala Ser Pro Trp Ser Trp Pro Asp Leu
2275 2280 2285

Asp Leu Lys Pro Gly Ala Ala Trp Thr Val Tyr Val Gly Ile Val Thr
2290 2295 2300

Met Leu Ser Pro Met Leu His His Trp Ile Lys Val Glu Tyr Gly Asn
2305 2310 2315 2320

Leu Ser Leu Ser Gly Ile Ala Gln Ser Ala Ser Val Leu Ser Phe Met
2325 2330 2335

Asp Lys Gly Ile Pro Phe Met Lys Met Asn Ile Ser Val Ile Met Leu
2340 2345 2350

Leu Val Ser Gly Trp Asn Ser Ile Thr Val Met Pro Leu Leu Cys Gly
2355 2360 2365

Ile Gly Cys Ala Met Leu His Trp Ser Leu Ile Leu Pro Gly Ile Lys
2370 2375 2380

Ala Gln Gln Ser Lys Leu Ala Gln Arg Arg Val Phe His Gly Val Ala
2385 2390 2395 2400

Lys Asn Pro Val Val Asp Gly Asn Pro Thr Val Asp Ile Glu Glu Ala
2405 2410 2415

Pro Glu Met Pro Ala Leu Tyr Glu Lys Lys Leu Ala Leu Tyr Leu Leu
2420 2425 2430

Leu Ala Leu Ser Leu Ala Ser Val Ala Met Cys Arg Thr Pro Phe Ser
2435 2440 2445

Leu Ala Glu Gly Ile Val Leu Ala Ser Ala Ala Ser Gly Pro Leu Ile
2450 2455 2460

Glu Gly Asn Thr Ser Leu Leu Trp Asn Gly Pro Met Ala Val Ser Met
2465 2470 2475 2480

Thr Gly Val Met Arg Gly Asn His Tyr Ala Phe Val Gly Val Met Tyr
2485 2490 2495

Asn Leu Trp Lys Met Lys Thr Gly Arg Arg Gly Ser Ala Asn Gly Lys
2500 2505 2510

Thr Leu Gly Glu Val Trp Lys Arg Glu Leu Asn Leu Leu Asp Lys Arg
2515 2520 2525

Gln Phe Glu Leu Tyr Lys Arg Thr Asp Ile Val Glu Val Asp Arg Asp
2530 2535 2540

Thr Ala Arg Arg His Leu Ala Glu Gly Lys Val Asp Thr Gly Val Ala
2545 2550 2555 2560

Val Ser Arg Gly Thr Ala Lys Leu Arg Trp Phe His Glu Arg Gly Tyr
2565 2570 2575

Val Lys Leu Glu Gly Arg Val Ile Asp Leu Gly Cys Gly Arg Gly Gly
2580 2585 2590

Trp Cys Tyr Tyr Ala Ala Gln Lys Glu Val Ser Gly Val Lys Gly

2595	2600	2605
Phe Thr Leu Gly Arg Asp Gly His Glu Lys Pro Met Asn Val Gln Ser		
2610	2615	2620
Leu Gly Trp Asn Ile Ile Thr Phe Lys Asp Lys Thr Asp Ile His Arg		
2625	2630	2635
2640		
Leu Glu Pro Val Lys Cys Asp Thr Leu Leu Cys Asp Ile Gly Glu Ser		
2645	2650	2655
Ser Ser Ser Val Thr Glu Gly Glu Arg Thr Val Arg Val Leu Asp		
2660	2665	2670
Thr Val Glu Lys Trp Leu Ala Cys Gly Val Asp Asn Phe Cys Val Lys		
2675	2680	2685
Val Leu Ala Pro Tyr Met Pro Asp Val Leu Glu Lys Leu Glu Leu Leu		
2690	2695	2700
Gln Arg Arg Phe Gly Gly Thr Val Ile Arg Asn Pro Leu Ser Arg Asn		
2705	2710	2715
2720		
Ser Thr His Glu Met Tyr Tyr Val Ser Gly Ala Arg Ser Asn Val Thr		
2725	2730	2735
Phe Thr Val Asn Gln Thr Ser Arg Leu Leu Met Arg Arg Met Arg Arg		
2740	2745	2750
Pro Thr Gly Lys Val Thr Leu Glu Ala Asp Val Ile Leu Pro Ile Gly		
2755	2760	2765
Thr Arg Ser Val Glu Thr Asp Lys Gly Pro Leu Asp Lys Glu Ala Ile		
2770	2775	2780
Glu Glu Arg Val Glu Arg Ile Lys Ser Glu Tyr Met Thr Ser Trp Phe		
2785	2790	2795
2800		
Tyr Asp Asn Asp Asn Pro Tyr Arg Thr Trp His Tyr Cys Gly Ser Tyr		
2805	2810	2815
Val Thr Lys Thr Ser Gly Ser Ala Ala Ser Met Val Asn Gly Val Ile		
2820	2825	2830
Lys Ile Leu Thr Tyr Pro Trp Asp Arg Ile Glu Glu Val Thr Arg Met		
2835	2840	2845
Ala Met Thr Asp Thr Thr Pro Phe Gly Gln Gln Arg Val Phe Lys Glu		
2850	2855	2860
Lys Val Asp Thr Arg Ala Lys Asp Pro Pro Ala Gly Thr Arg Lys Ile		
2865	2870	2875
2880		
Met Lys Val Val Asn Arg Trp Leu Phe Arg His Leu Ala Arg Glu Lys		
2885	2890	2895

Asn Pro Arg Leu Cys Thr Lys Glu Glu Phe Ile Ala Lys Val Arg Ser
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His Ala Ala Ile Gly Ala Tyr Leu Glu Glu Gln Gln Trp Lys Thr
2915 2920 2925

Ala Asn Glu Ala Val Gln Asp Pro Lys Phe Trp Glu Leu Val Asp Glu
2930 2935 2940

Glu Arg Lys Leu His Gln Gln Gly Arg Cys Arg Thr Cys Val Tyr Asn
2945 2950 2955 2960

Met Met Gly Lys Arg Glu Lys Lys Leu Ser Glu Phe Gly Lys Ala Lys
2965 2970 2975

Gly Ser Arg Ala Ile Trp Tyr Met Trp Leu Gly Ala Arg Tyr Leu Glu
2980 2985 2990

Phe Glu Ala Leu Gly Phe Leu Asn Glu Asp His Trp Ala Ser Arg Glu
2995 3000 3005

Asn Ser Gly Gly Val Glu Gly Ile Gly Leu Gln Tyr Leu Gly Tyr
3010 3015 3020

Val Ile Arg Asp Leu Ala Ala Met Asp Gly Gly Phe Tyr Ala Asp
3025 3030 3035 3040

Asp Thr Ala Gly Trp Asp Thr Arg Ile Thr Glu Ala Asp Leu Asp Asp
3045 3050 3055

Glu Gln Glu Ile Leu Asn Tyr Met Ser Pro His His Lys Lys Leu Ala
3060 3065 3070

Gln Ala Val Met Glu Met Thr Tyr Lys Asn Lys Val Val Lys Val Leu
3075 3080 3085

Arg Pro Ala Pro Gly Gly Lys Ala Tyr Met Asp Val Ile Ser Arg Arg
3090 3095 3100

Asp Gln Arg Gly Ser Gly Gln Val Val Thr Tyr Ala Leu Asn Thr Ile
3105 3110 3115 3120

Thr Asn Leu Lys Val Gln Leu Ile Arg Met Ala Glu Ala Glu Met Val
3125 3130 3135

Ile His His Gln His Val Gln Asp Cys Asp Glu Ser Val Leu Thr Arg
3140 3145 3150

Leu Glu Ala Trp Leu Thr Glu His Gly Cys Asn Arg Leu Lys Arg Met
3155 3160 3165

Ala Val Ser Gly Asp Asp Cys Val Val Arg Pro Ile Asp Asp Arg Phe
3170 3175 3180

Gly Leu Ala Leu Ser His Leu Asn Ala Met Ser Lys Val Arg Lys Asp
3185 3190 3195 3200

Ile Ser Glu Trp Gln Pro Ser Lys Gly Trp Asn Asp Trp Glu Asn Val
 3205 3210 3215

Pro Phe Cys Ser His His Phe His Glu Leu Gln Leu Lys Asp Gly Arg
 3220 3225 3230

Arg Ile Val Val Pro Cys Arg Glu Gln Asp Glu Leu Ile Gly Arg Gly
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Arg Val Ser Pro Gly Asn Gly Trp Met Ile Lys Glu Thr Ala Cys Leu
 3250 3255 3260

Ser Lys Ala Tyr Ala Asn Met Trp Ser Leu Met Tyr Phe His Lys Arg
 3265 3270 3275 3280

Asp Met Arg Leu Leu Ser Leu Ala Val Ser Ser Ala Val Pro Thr Ser
 3285 3290 3295

Trp Val Pro Gln Gly Arg Thr Thr Trp Ser Ile His Gly Lys Gly Glu
 3300 3305 3310

Trp Met Thr Thr Glu Asp Met Leu Glu Val Trp Asn Arg Val Trp Ile
 3315 3320 3325

Thr Asn Asn Pro His Met Gln Asp Lys Thr Met Val Lys Lys Trp Arg
 3330 3335 3340

Asp Val Pro Tyr Leu Thr Lys Arg Gln Asp Lys Leu Cys Gly Ser Leu
 3345 3350 3355 3360

Ile Gly Met Thr Asn Arg Ala Thr Trp Ala Ser His Ile His Leu Val
 3365 3370 3375

Ile His Arg Ile Arg Thr Leu Ile Gly Gln Glu Lys Tyr Thr Asp Tyr
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 3395 3400 3405

Glu Leu Ile
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 Ala His Cys Ile Gly Ile Thr Asp Arg Asp Phe Ile Glu Gly Val His

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gga gga act tgg gtt tca gct acc ctg gag cac gac aag tgg gtc act				96
Gly Gly Thr Trp Val Ser Ala Thr Leu Glu His Lys Cys Val Thr				
20	25	30		
gtt atg gcc cct gac aag cct tca ttg gac atc tca cta gag aca gta				144
Val Met Ala Pro Asp Lys Pro Ser Leu Asp Ile Ser Leu Glu Thr Val				
35	40	45		
gcc att gat gga cct gct gag gcg agg aaa gtt tgg tgg tac aat gca gtt				192
Ala Ile Asp Gly Pro Ala Glu Ala Arg Lys Val Cys Tyr Asn Ala Val				
50	55	60		
ctc act cat gtt aag att aat gac aag tgc ccc agc act gga gag gcc				240
Leu Thr His Val Lys Ile Asn Asp Lys Cys Pro Ser Thr Gly Glu Ala				
65	70	75	80	
cac cta gct gaa gag aac gaa ggg gac aat gcg tgc aag cgc act tat				288
His Leu Ala Glu Glu Asn Glu Gly Asp Asn Ala Cys Lys Arg Thr Tyr				
85	90	95		
tct gat aga ggc tgg ggc aat ggc tgg ggc cta ttt ggg aaa ggg agc				336
Ser Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Ser				
100	105	110		
att gtg gca tgc gcc aaa ttc act tgg gcc aaa tcc atg agt ttg ttt				384
Ile Val Ala Cys Ala Lys Phe Thr Cys Ala Lys Ser Met Ser Leu Phe				
115	120	125		
gag gtt gat cag acc aaa att cag tat gtc atc aga gca caa ttg cat				432
Glu Val Asp Gln Thr Lys Ile Gln Tyr Val Ile Arg Ala Gln Leu His				
130	135	140		
gta ggg gcc aag cag gaa aat tgg aat acc gcc att aag act ctc aag				480
Val Gly Ala Lys Gln Glu Asn Trp Asn Thr Ala Ile Lys Thr Leu Lys				
145	150	155	160	
ttt gat gcc ctg tca ggc tcc cag gaa gcc gag ttc act ggg tat gga				528
Phe Asp Ala Leu Ser Gly Ser Gln Glu Ala Glu Phe Thr Gly Tyr Gly				
165	170	175		
aaa gct aca ctg gaa tgc cag gtt caa act gcg gtt gac ttt ggt aac				576
Lys Ala Thr Leu Glu Cys Gln Val Gln Thr Ala Val Asp Phe Gly Asn				
180	185	190		
agt tac atc gct gag atg gaa aaa gag agc tgg ata gtt gac aga cag				624
Ser Tyr Ile Ala Glu Met Glu Lys Glu Ser Trp Ile Val Asp Arg Gln				
195	200	205		
tgg gcc cag gac ttg acc ctg cca tgg cag agt gga agt ggc ggg gtt				672
Trp Ala Gln Asp Leu Thr Leu Pro Trp Gln Ser Gly Ser Gly Gly Val				
210	215	220		
tgg aga gag atg cat cat ctt gtc gaa ttt gaa cct ccg cat gcc gcc				720
Trp Arg Glu Met His His Leu Val Glu Phe Glu Pro Pro His Ala Ala				

225	230	235	240	
act atc aga gta ctg gcc ctg gga aac cag gaa ggc tcc ttg aaa aca				768
Thr Ile Arg Val Leu Ala Leu Gly Asn Gln Glu Gly Ser Leu Lys Thr				
245	250	255		
gct ctt acc ggc gca atg agg gtt aca aag gac aca aat gac aac aac				816
Ala Leu Thr Gly Ala Met Arg Val Thr Lys Asp Thr Asn Asp Asn Asn				
260	265	270		
ctt tac aaa cta cat ggt gga cat gtt tcc tgc aga gtg aaa ttg tca				864
Leu Tyr Lys Leu His Gly Gly His Val Ser Cys Arg Val Lys Leu Ser				
275	280	285		
gct ttg aca ctc aag ggg aca tcc tac aaa atg tgc act gac aaa atg				912
Ala Leu Thr Leu Lys Gly Thr Ser Tyr Lys Met Cys Thr Asp Lys Met				
290	295	300		
tct ttt gtc aag aac cca act gac act ggc cat ggc act gtt gtg atg				960
Ser Phe Val Lys Asn Pro Thr Asp Thr Gly His Gly Thr Val Val Met				
305	310	315	320	
cag gtg aga gtg cca aaa gga gcc ccc tgc agg att cca gtg ata gta				1008
Gln Val Arg Val Pro Lys Gly Ala Pro Cys Arg Ile Pro Val Ile Val				
325	330	335		
gct gat gat ctt aca gcg gca atc aat aaa ggc att ttg gtt aca gtt				1056
Ala Asp Asp Leu Thr Ala Ala Ile Asn Lys Gly Ile Leu Val Thr Val				
340	345	350		
aac ccc atc gcc tca acc aat gat gat gaa gtg ctg att gag gtg aac				1104
Asn Pro Ile Ala Ser Thr Asn Asp Asp Glu Val Leu Ile Glu Val Asn				
355	360	365		
cca cct ttt gga gac agc tac att atc gtt ggg aca gga gat tca cgt				1152
Pro Pro Phe Gly Asp Ser Tyr Ile Ile Val Gly Thr Gly Asp Ser Arg				
370	375	380		
ctc act tac cag tgg cac aaa gag gga agc tca ata gga aag ttg ttc				1200
Leu Thr Tyr Gln Trp His Lys Glu Gly Ser Ser Ile Gly Lys Leu Phe				
385	390	395	400	
act cag acc atg aaa ggc gcg gaa cgc ctg gcc gtc atg gga gac gcc				1248
Thr Gln Thr Met Lys Gly Ala Glu Arg Leu Ala Val Met Gly Asp Ala				
405	410	415		
gcc tgg gat ttc agc tcc gct gga ggg ttc ttc act tcg gtt ggg aaa				1296
Ala Trp Asp Phe Ser Ser Ala Gly Gly Phe Phe Thr Ser Val Gly Lys				
420	425	430		
gga att cat acg gtg ttt ggc tct gcc ttt cag ggg cta ttt ggc ggc				1344
Gly Ile His Thr Val Phe Gly Ser Ala Phe Gln Gly Leu Phe Gly Gly				
435	440	445		
ttg aac tgg ata aca aag gtc atc atg ggg gcg gta ctc ata tgg gtt				1392
Leu Asn Trp Ile Thr Lys Val Ile Met Gly Ala Val Leu Ile Trp Val				

450

455

460

ggc atc aac aca aga aac atg aca atg tcc atg agc atg atc ttg gta 1440
 Gly Ile Asn Thr Arg Asn Met Thr Met Ser Met Ser Met Ile Leu Val
 465 470 475 480

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 Gly Val Ile Met Met Phe Leu Ser Leu Gly Val Gly Ala
 485 490

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 <213> Yellow fever virus

<400> 4
 Ala His Cys Ile Gly Ile Thr Asp Arg Asp Phe Ile Glu Gly Val His
 1 5 10 15

Gly Gly Thr Trp Val Ser Ala Thr Leu Glu His Gly Lys Cys Val Thr
 20 25 30

Val Met Ala Pro Asp Lys Pro Ser Leu Asp Ile Ser Leu Glu Thr Val
 35 40 45

Ala Ile Asp Gly Pro Ala Glu Ala Arg Lys Val Cys Tyr Asn Ala Val
 50 55 60

Leu Thr His Val Lys Ile Asn Asp Lys Cys Pro Ser Thr Gly Glu Ala
 65 70 75 80

His Leu Ala Glu Glu Asn Glu Gly Asp Asn Ala Cys Lys Arg Thr Tyr
 85 90 95

Ser Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Ser
 100 105 110

Ile Val Ala Cys Ala Lys Phe Thr Cys Ala Lys Ser Met Ser Leu Phe
 115 120 125

Glu Val Asp Gln Thr Lys Ile Gln Tyr Val Ile Arg Ala Gln Leu His
 130 135 140

Val Gly Ala Lys Gln Glu Asn Trp Asn Thr Ala Ile Lys Thr Leu Lys
 145 150 155 160

Phe Asp Ala Leu Ser Gly Ser Gln Glu Ala Glu Phe Thr Gly Tyr Gly
 165 170 175

Lys Ala Thr Leu Glu Cys Gln Val Gln Thr Ala Val Asp Phe Gly Asn
 180 185 190

Ser Tyr Ile Ala Glu Met Glu Lys Glu Ser Trp Ile Val Asp Arg Gln
 195 200 205

Trp Ala Gln Asp Leu Thr Leu Pro Trp Gln Ser Gly Ser Gly Gly Val
210 215 220

Trp Arg Glu Met His His Leu Val Glu Phe Glu Pro Pro His Ala Ala
225 230 235 240

Thr Ile Arg Val Leu Ala Leu Gly Asn Gln Glu Gly Ser Leu Lys Thr
245 250 255

Ala Leu Thr Gly Ala Met Arg Val Thr Lys Asp Thr Asn Asp Asn Asn
260 265 270

Leu Tyr Lys Leu His Gly Gly His Val Ser Cys Arg Val Lys Leu Ser
275 280 285

Ala Leu Thr Leu Lys Gly Thr Ser Tyr Lys Met Cys Thr Asp Lys Met
290 295 300

Ser Phe Val Lys Asn Pro Thr Asp Thr Gly His Gly Thr Val Val Met
305 310 315 320

Gln Val Arg Val Pro Lys Gly Ala Pro Cys Arg Ile Pro Val Ile Val
325 330 335

Ala Asp Asp Leu Thr Ala Ala Ile Asn Lys Gly Ile Leu Val Thr Val
340 345 350

Asn Pro Ile Ala Ser Thr Asn Asp Asp Glu Val Leu Ile Glu Val Asn
355 360 365

Pro Pro Phe Gly Asp Ser Tyr Ile Ile Val Gly Thr Gly Asp Ser Arg
370 375 380

Leu Thr Tyr Gln Trp His Lys Glu Gly Ser Ser Ile Gly Lys Leu Phe
385 390 395 400

Thr Gln Thr Met Lys Gly Ala Glu Arg Leu Ala Val Met Gly Asp Ala
405 410 415

Ala Trp Asp Phe Ser Ser Ala Gly Gly Phe Phe Thr Ser Val Gly Lys
420 425 430

Gly Ile His Thr Val Phe Gly Ser Ala Phe Gln Gly Leu Phe Gly Gly
435 440 445

Leu Asn Trp Ile Thr Lys Val Ile Met Gly Ala Val Leu Ile Trp Val
450 455 460

Gly Ile Asn Thr Arg Asn Met Thr Met Ser Met Ser Met Ile Leu Val
465 470 475 480

Gly Val Ile Met Met Phe Leu Ser Leu Gly Val Gly Ala
485 490